# UNITED STATES PATENT AND TRADEMARK OFFICE

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 10/788,589 | 02/27/2004 | Ronald S. Karr | VRT0120US | 6846 |

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| 60429 | 7590 | 09/12/2006 | | |

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| EXAMINER |
|---|
| KIM, DANIEL Y |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2185 | |

DATE MAILED: 09/12/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

| | Application No. | Applicant(s) |
|---|---|---|
| **Office Action Summary** | 10/788,589 | KARR ET AL. |
| | Examiner | Art Unit | |
| | Daniel Kim | 2185 | |

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☐ Responsive to communication(s) filed on _____.

2a)☒ This action is **FINAL**.      2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1,2,4-18 and 20-26* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4-18 and 20-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All  b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

## DETAILED ACTION

### *Response to Amendment*

1.      This Office Action is in response to applicant's communication filed June 29,

2006 in response to the PTO Office Action mailed May 1, 2006. The applicant's remarks

and amendments to the claims and/or the specification were considered with the results

that follow.

2.      In response to the last Office Action, claims 1, 4, 5, 11-12, 15, 17 and 22-23 have

been amended, claims 3 and 19 have been cancelled, and no other claims have been

added. Claims 1-2, 4-18 and 20-25 remain pending in this application.

### *Response to Arguments*

3.      Applicant's arguments with respect to claim 3, all amended independent claims

and their respective dependent claims have been considered but are moot in view of the

new ground(s) of rejection.

### *Claim Rejections - 35 USC § 103*

4.      The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

5.      Claims 1-2, 4-6, 13, 15-18, 20-21 and 24-26 are rejected under 35 U.S.C. 103(a)

as being unpatentable over Satran et al (US Patent No. 6,668,304) and Young (US

Patent No. 7,080,198).

For claim 1, Satran discloses a method comprising:

a computer system generating first and second write transactions (an improved

system for supporting data transactions, col. 2, lines 61-63);

wherein the first and second write transactions comprise first and second tags,

respectively, wherein each of the first and second tags relate the first write transaction

to the second write transaction (tags indicate which of the data blocks is currently

engaged in an open data transaction, col. 5, lines 10-11; one or more data fields include

a tag indicative of a state of the data transaction, col. 5, lines 66-67; the data transaction

comprises a plurality of concurrent data transactions, col. 6, lines 7-8);

the computer system transmitting the first and second write transactions to first

and second storage devices, respectively (one or more storage devices are used for

storing data contents of transactions initiated by one or more clients of the storage

devices, col. 3, lines 1-3);

wherein the first write transaction comprises data D to be written (col. 3, lines 1-

4);

Satran fails to disclose the remaining claim limitations.

Young, however, helps discloses the second write transaction comprises data D

to be written (in a write transaction, a second device snoops on an I/O bus for a write

command directed to a first device; the second device copies data specified in the write

command from the I/O bus to the second device upon detection of the write command; the second device issues a write command complete notification following completion of the copying, col. 3, lines 19-25; a mirror target device initiates execution of the write command by copying data specified in the write command, upon detecting the write command directed to the primary target device, from the I/O bus and storing the data on the mirror target device; the mirror target device issues a write command complete notification following completion of the copying, col. 3, lines 34-40).

Satran and Young are analogous art in that they are of the same field of endeavor, that is, a system and/or method of memory management. It would have been obvious to a person of ordinary skill in the art at the time of the invention to include the same data D to be written in two separate write transactions because this is the simplest scheme for providing data redundancy so that if one data storage device fails, the data content is retrievable from the mirror data storage device (col. 1, lines 21-27), as taught by Young.

Claim 2 is rejected using the combined rationale as in the rejection of claim 1 above.

For claim 4, the combined teachings of Satran and Young disclose the invention as per rejection of claim 1 above.

Satran further helps disclose the first storage device receiving the first write transaction (at least one transaction supporting logical disk which is adapted to receive data, col. 4, lines 42-44);

the first storage device storing in an entry of a first tag table, the first tag and an

identity of the logical block where data D is to be written, wherein the first tag table is

stored in first memory (storing the one or more data structures includes storing a

translation table which maps logical block addresses of the succession of data blocks to

respective physical addresses and which tags which of the data blocks is currently

engaged in an open data transaction, col. 6, lines 54-58; storing in at least one volatile

memory one or more data structures containing data indicative of one or more

properties of at least some of the data blocks, and writing at least some of the data that

are in the data structures to the at least one transaction supporting logical disk, so that

the contents of the at least one volatile memory can be regenerated from the at least

some of the data in the one or more data structures that are stored in the at least one

transaction supporting logical disk, col. 6, lines 46-53)

the second storage device receiving the second write transaction (col. 4, lines

42-44);

the second storage device storing in an entry of a second tag table, the second

tag and an identity of the logical block where data D is to be written, wherein the second

tag table is stored in second memory (col. 6, lines 46-58).

Claim 5 is rejected using the combined rationale as in the rejection of claims 1

and 4 above.

Claim 6 is rejected using the combined rationale as in the rejection of claims 1

and 4 above.

For claim 13, the combined teachings of Satran and Young disclose the invention as per rejection of claim 1 above.

Satran further helps disclose the first write transaction comprises data D to be written to an extension of a first storage object (performing a recovery operation includes determining a state of an open transaction to query the state and decide whether to commit or abort the open transaction, col. 8, lines 11-14); the second write transaction comprises data D to be written to an extension of a second storage object (col. 8, lines 11-14).

For claim 15, Satran discloses generating first and second write transactions (col. 2, lines 61-63);

wherein the first and second write transactions comprises first and second tags, respectively (col. 5, lines 10-11, 66-67), wherein the first and second tags are identical to each other (a tag for each entry in the translation table can be set to indicate that a block is currently engaged in an open transaction, col. 12, lines 8-11);

the computer system transmitting the first and second write transactions to first and second storage devices, respectively (col. 3, lines 1-4);

wherein the first write transaction comprises data D (col. 3, lines 1-4).

Satran fails to disclose the remaining claim limitations.

Young, however, helps disclose the second write transaction comprises data D to be written (col. 3, lines 19-25, 34-40).

Satran and Young are analogous art in that they are of the same field of endeavor, that is, a system and/or method of memory management. It would have been

obvious to a person of ordinary skill in the art at the time of the invention to include the

same data D to be written in two separate write transactions because this is the

simplest scheme for providing data redundancy so that if one data storage device fails,

the data content is retrievable from the mirror data storage device (col. 1, lines 21-27),

as taught by Young.

Claim 16 is rejected using the combined rationale as for the rejection of claims 1-

2 above.

For claim 17, Satran discloses a computer readable medium storing instructions

executable by a computer system, wherein the computer system implements a method

in response to executing the instructions (a computer software product for performing a

data transaction, including a computer-readable medium having program instructions

recorded therein, with instructions to be read by a computer, col. 9, lines 4-26), the

method comprising:

generating first and second write transactions (col. 2, lines 61-63);

wherein the first and second write transactions comprises first and second tags,

respectively, wherein each of the first and second tags relate the first write transaction

to the second write transaction (col. 5, lines 10-11, 66-67);

transmitting the first and second write transactions directly or indirectly to first

and second storage devices, respectively (col. 3, lines 1-4);

wherein the first write transaction comprises data D to be written (col. 3, lines 1-

4).

Satran fails to disclose the remaining claim limitations.

Young, however, helps discloses the second write transaction comprises data D to be written (col. 3, lines 19-25, 34-40).

Satran and Young are analogous art in that they are of the same field of endeavor, that is, a system and/or method of memory management. It would have been obvious to a person of ordinary skill in the art at the time of the invention to include the same data D to be written in two separate write transactions because this is the simplest scheme for providing data redundancy so that if one data storage device fails, the data content is retrievable from the mirror data storage device (col. 1, lines 21-27), as taught by Young.

Claim 18 is rejected using the combined rationale as in the rejection of claims 1-2 and 17 above.

Claim 20 is rejected using the combined rationale as in the rejection of claims 5 and 17 above.

Claim 21 is rejected using the same rationale as for the rejection of claims 15 and 17 above.

Claim 24 is rejected using the same rationale as for the rejections of claims 13 and 17 above.

For claim 25, Satran discloses a computer readable medium storing instructions executable by a computer system, wherein the computer system implements a method in response to executing the instructions (col. 9, lines 4-26), the method comprising:

generating first and second write transactions (col. 2, lines 61-63);

wherein the first and second write transactions comprises first and second tags, respectively (col. 5, lines 10-11, 66-67);

the computer system transmitting the first and second write transactions to first and second storage devices, respectively (col. 3, lines 1-4);

wherein the first write transaction comprises data D (col. 3, lines 1-4).

Satran fails to disclose the remaining claim limitations.

Young, however, helps discloses the second write transaction comprises data D (col. 3, lines 19-25, 34-40).

Satran and Young are analogous art in that they are of the same field of endeavor, that is, a system and/or method of memory management. It would have been obvious to a person of ordinary skill in the art at the time of the invention to include the same data D to be written in two separate write transactions because this is the simplest scheme for providing data redundancy so that if one data storage device fails, the data content is retrievable from the mirror data storage device (col. 1, lines 21-27), as taught by Young.

For claim 26, Satran discloses a computer readable medium storing instructions executable by a computer system, wherein the computer system implements a method in response to executing the instructions (col. 9, lines 4-26), the method comprising:

in response to receiving a first transaction comprising a first tag and data D, storing in an entry of a first tag table, the first tag and an identity of a logical block where the data D is to be written, wherein the first tag table is stored in first memory (col. 6, lines 54-58, col. 6, lines 46-53),

wherein the first tag corresponds to a second tag of a second write transaction (col. 5, lines 10-11, 66-67, col. 6, lines 7-8);

a second storage device receiving the second write transaction (col. 6, lines 54-58, col. 6, lines 46-53);

the second storage device storing in an entry of a second tag table, the second tag and an identity of the logical block where data D is to be written, wherein the second tag table is stored in second memory (col. 6, lines 54-58, col. 6, lines 46-53).

Satran fails to disclose the remaining claim limitations.

Young, however, helps disclose the second write transaction comprises data D (col. 3, lines 19-25, 34-40).

Satran and Young are analogous art in that they are of the same field of endeavor, that is, a system and/or method of memory management. It would have been obvious to a person of ordinary skill in the art at the time of the invention to include the same data D to be written in two separate write transactions because this is the simplest scheme for providing data redundancy so that if one data storage device fails, the data content is retrievable from the mirror data storage device (col. 1, lines 21-27), as taught by Young.


6.      Claims 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Satran et al (US Patent No. 6,668,304), Young (US Patent No. 7,080,198) and Gaither et al (US PGPub No. 20040098544).

For claim 7, the combined teachings of Satran and Young disclose the invention as per rejection of claim 4 above.

These teachings fail to disclose the limitations of claim 7.

Gaither, however, helps disclose comparing the contents of one entry in the first tag table with the contents of entries in the second tag table to determine whether the second tag table includes an entry that matches the one entry (a virtual compression system may be configured to identify units of memory that share identical content among a plurality of partitions, par. 0031; a copy counter may be associated with each entry in a page partition table, and when a new identical page has been determined, the copy counter may be incremented for each entry that references the matching page across the partitions, par. 0032).

Satran, Young and Gaither are analogous art in that they are of the same field of endeavor, that is, a system and/or method of memory management. It would have been obvious to a person of ordinary skill in the art at the time of the invention to include comparing entries for a match in content because otherwise, many of the mass storage partitions may contain duplicate information (par. 0003), and updating respective partition page tables that reference matching pages accordingly may optimize memory systems across partitions (par. 0025), as taught by Gaither.

For claim 8, the combined teachings of Satran, Young and Gaither disclose the invention as per rejection of claim 7 above.

Gaither further helps disclose copying data, associated with the logical block number identified by the one entry, from the first storage object to the logical block in

the second storage object if the second table lacks an entry with contents matching the contents of the one entry (the controller may copy the contents of the matching page to the requested page and forward the requested data to the memory system to perform the write operation, par. 0060).

For claim 9, the combined teachings of Satran, Young and Gaither disclose the invention as per rejection of claim 7 above.

Gaither further helps disclose deleting the one entry in the first table if the second table contains an entry with contents that match the contents of the one entry (any mapping to duplicate pages is removed and the duplicate pages are returned to a free page pool, which is maintained by the virtual compression system, par. 0019).

Claim 10 is rejected using the combined rationale as in the rejection of claim 9 above.


7.      Claims 11-12, 14-15 and 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Satran et al (US Patent No. 6,668,304), Young (US Patent No. 7,080,198) and Mattis et al (US Patent No. 6,128,627).

For claim 11, the combined teachings of Satran and Young disclose the invention as per rejection of claim 1 above.

These teachings fail to disclose the limitations of claim 11.

Mattis, however, helps disclose the computer system generating a write transaction to write data to a logical block of a data volume;

the computer system incrementing a counter in response to generating the write

transaction (if a matching block is not currently in the process of being created or

destroyed, then the block can be used, and the process increments a write counter,

which is an internal variable, stored in association with the block, that indicates the

number of processor or programmatic objects that are writing the block, col. 34, lines

52-58);

the computer system generating the first and second tags, wherein each of the

first and second tags relate to the first and second write transactions, respectively,

wherein the first and second tags are generated in response to generation of the write

transaction, and wherein the first and second tags are generated as a function of an

output of the incremented counter.

Satran, Young and Mattis are analogous art in that they are of the same field of

endeavor, that is, a system and/or method of memory management. It would have been

obvious to a person of ordinary skill in the art at the time of the invention to include a

write counter because this would indicate the number of processor or programmatic

objects that are writing the block (col. 34, lines 56-58).

For claim 12, the combined teachings of Satran, Young and Mattis disclose the

invention as per rejection of claim 11 above.

Mattis further helps disclose the first and second storage devices comprise first

and second object storage devices (a cache of information objects comprising a

directory table that indexes each of the information objects in one of a plurality of

buckets, col. 5, lines 66-67, col. 6, lines 1-2).

Claim 14 is rejected using the combined rationale as in the rejection of claims 1 and 12-13 above.

Claim 22 is rejected using the combined rationale as in the rejection of claims 11 and 17 above.

Claim 23 is rejected using the combined rationale as in the rejection of claims 12 and 17 above.

### Citation of Pertinent Prior Art

8.    The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Dang et al (US Patent No. 6,606,682) discloses sequentially-ordered memory clusters for caching disk data stored in sectors, which are identified by logical block addresses. There is included a cache control system, a tag memory comprising tag records assigned to segments of continuous ranges of logical block addresses.

### Conclusion

9.    Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.
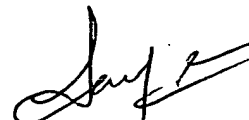
### Contact Information

10.    Any inquiries concerning this action or earlier actions from the examiner should be directed to Daniel Kim, reachable at 571-272-2742, on Mon-Fri from 8:30am-5pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mano Padmanabhan, is also reachable at 571-272-4210.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information from published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. All questions regarding access to the Private PAIR system should be directed to the Electronic Business Center (EBC), reachable at 866-217-9197.

9-1-06

SANJIV SHAH
PRIMARY EXAMINER